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(54) An access cover and frame assembly

(57) A road surface or other access cover is releasably fastened to its annular frame by screws 19 engaging cold-formed brackets 18 each of which has a horizontal portion (22) with an internally threaded aperture (21) therein and two vertical arms (23) each provided along a free edge with a projecting part which extends into an aperture in the frame and by which the bracket is attached to the frame. In one embodiment the projecting parts are fingers (24) bent over on the underside of the frame to prevent the bracket from coming away from the frame. Alternatively (Figs. 4–6) the arms may be triangular and the projecting parts be tabs secured to the frame by welding on the underside of the frame.

The frame may have inner and outer seating channels.

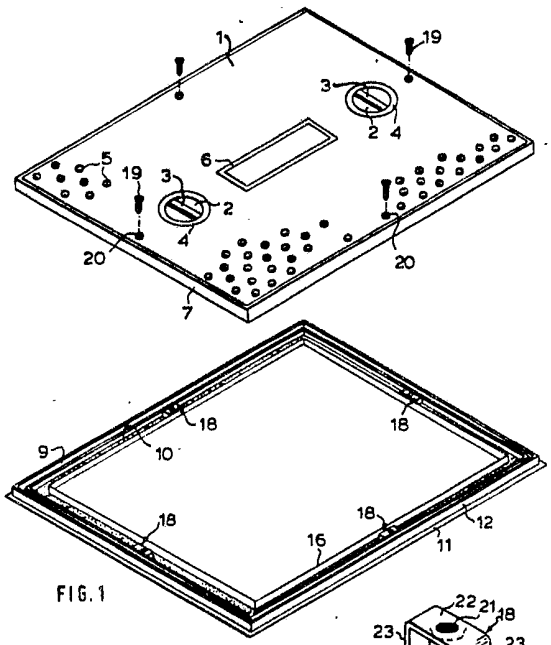

FIG.1

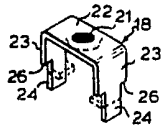

FIG.3.

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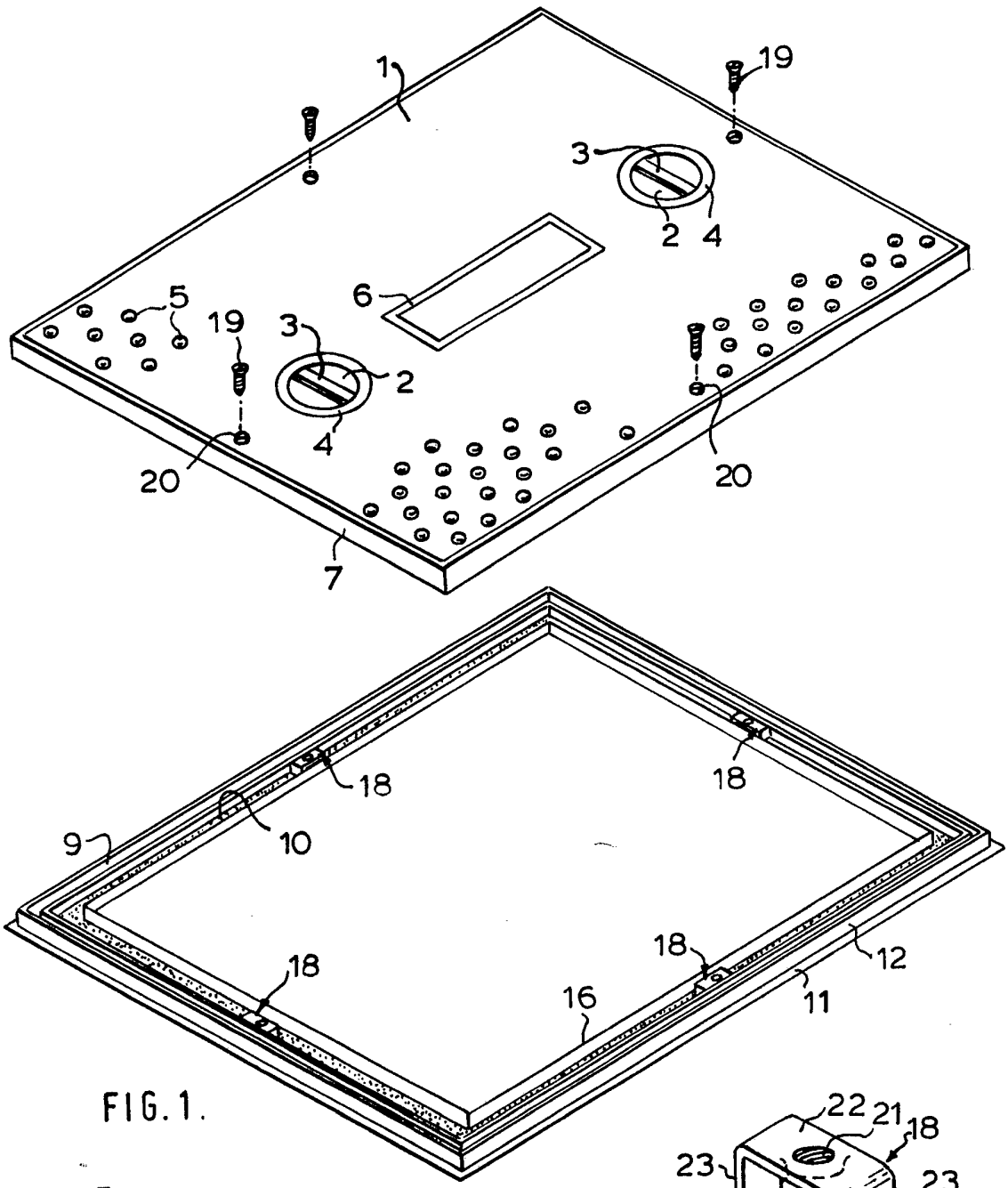


FIG.1.

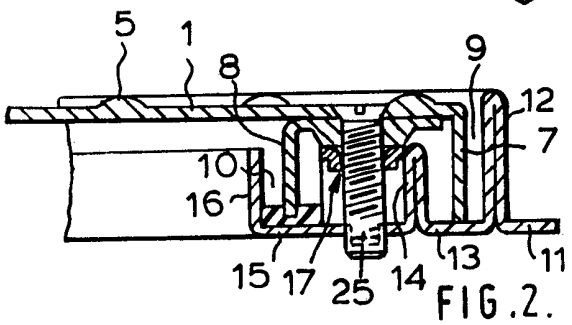


FIG.2.

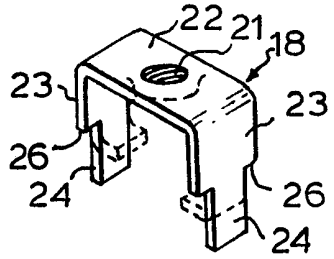
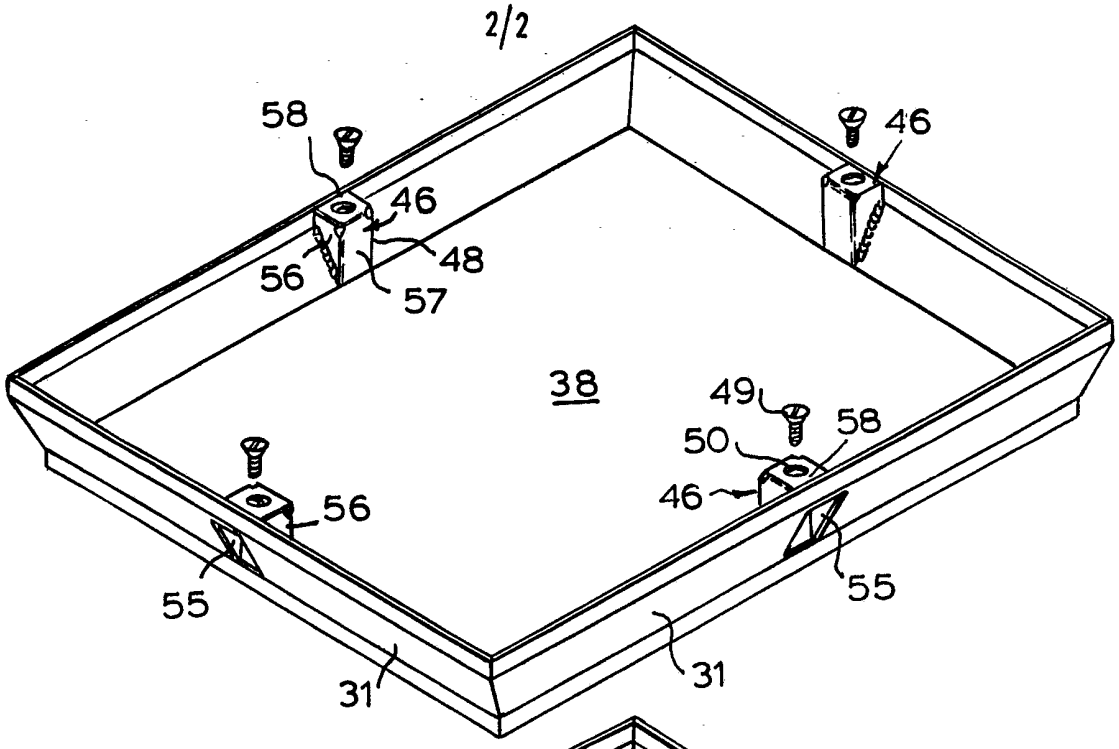


FIG.3.



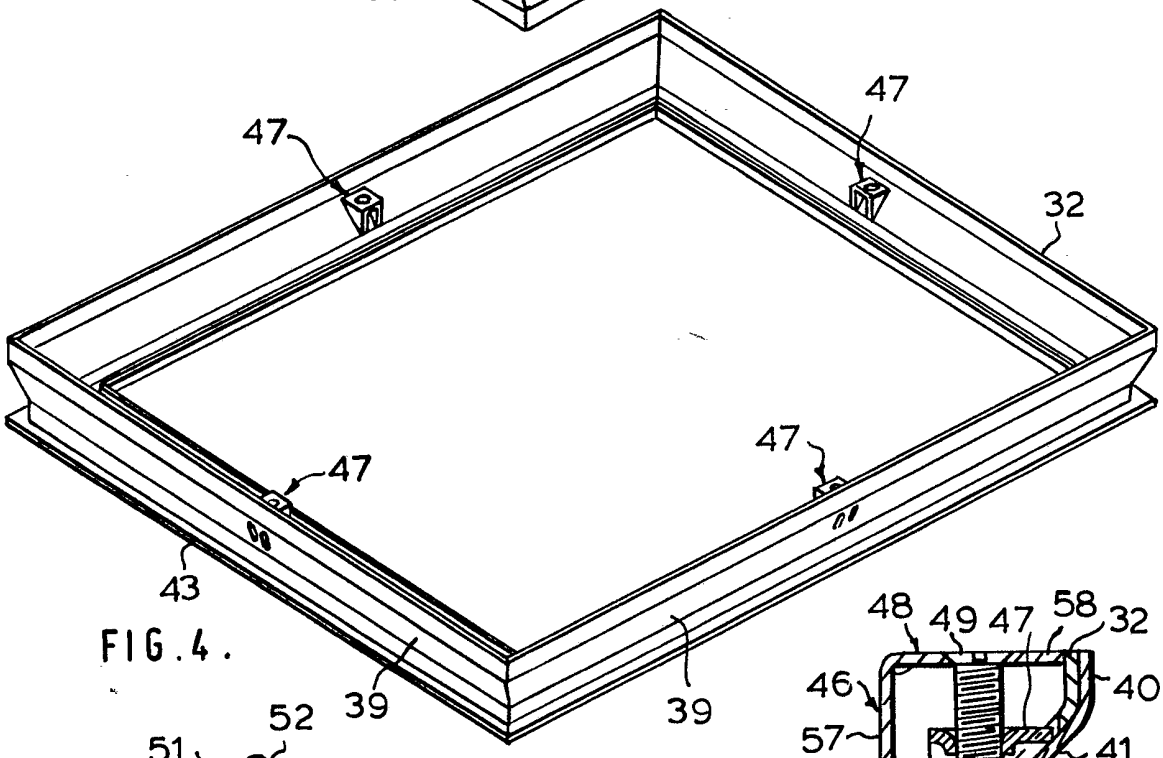


FIG.4.

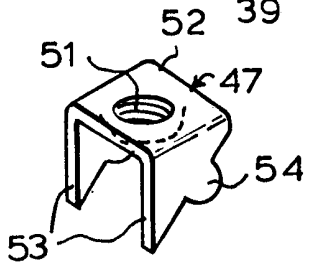


FIG.6.

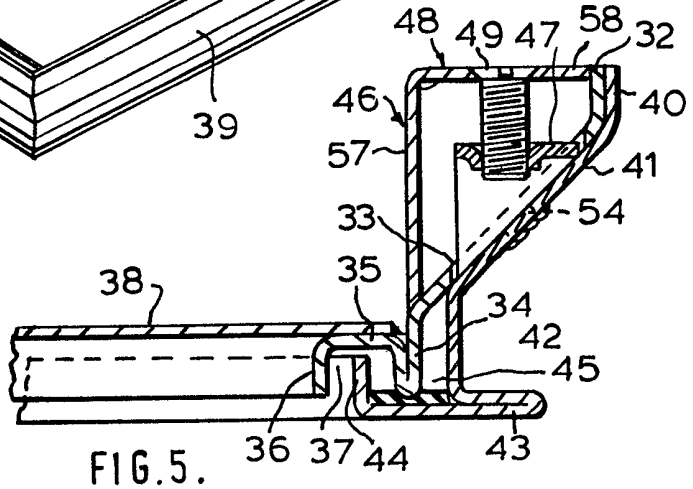


FIG.5.

SPECIFICATION

An access cover and frame assembly

This invention relates to an access cover and frame assembly and more particularly to a load bearing access cover and frame assembly for an inspection or access hole, e.g. a sewage manhole in a traffic bearing surface, such as a road surface or a pavement.

According to the invention there is provided an access cover and frame assembly, comprising an annular frame, a cover adapted to fit in the frame and releasable fastening means for fastening the cover to the frame, the releasable fastening means comprising at least one bracket attached to the frame and a screw threaded fastener, the bracket having a substantially horizontal portion with an internally threaded aperture therein and two substantially vertical arms each provided along a free edge with a projecting part which extends into an aperture in the frame and by which the bracket is located relative to the frame, the fastener being for extending through an aperture in the cover and for mating with the internally threaded aperture in the substantially horizontal portion of the bracket.

The terms "horizontal" and "vertical" are used herein in relation to the cover and frame assembly on the basis that the cover and frame are laid down flat on a horizontal surface. It is, however, to be understood that the cover and frame assembly need not necessarily cover a hole in a horizontal surface and it may for example cover a hole in a vertical surface.

Preferably, the free ends of the projecting parts of the bracket are turned under the frame after insertion through respective apertures in the frame. The free ends of the projecting parts prevent the bracket from being pulled away from the frame when the screw-threaded fastener is tightened to hold the cover in the frame. The free ends of the projecting parts may, advantageously, extend towards each other underneath the frame.

Alternatively, the bracket is secured to the frame by welding, and preferably by welding the projecting parts to the underside of the frame.

Advantageously, the bracket is of generally inverted U-shape and the substantially horizontal portion defines a web between the two substantially vertical arms which depend from the substantially horizontal portion.

The bracket may have been cold formed, such as by pressing, in one piece and the internally threaded aperture in the bracket may have been formed by punching and subsequently tapping.

The cover and frame may have been cold formed, e.g. by rolling and/or pressing and preferably, the frame and cover have a protective coating. In the latter case, the frame may have been given its protective coating before the bracket was connected thereto.

Preferably, the annular frame defines at least one annular channel for receiving a seal and the cover has at least one downwardly extending flange adapted to be received in the annular channel of the frame in sealing contact with the seal.

Conveniently, the annular frame defines an inner and an outer annular channel and the cover has inner and outer downwardly extending flanges, the outer flange(s) being arranged so as to be received in the outer channel and the inner flange(s) being arranged to be received in the inner channel, at least the inner channel being for receiving a seal.

Preferably, the bracket is disposed so that in use it is on the side of the contact zone between the seal and the cover remote from the inner periphery of the frame. This renders the assembly stenchproof.

Conveniently, the cover is of metal plate and has a load bearing surface having a lifting device comprising a recess pressed in the plate and a lifting bar attached to the plate and extending across the recess.

Alternatively, the cover is recessed to receive an infill. In this case the bracket may be connected to an inclined wall of the frame and the aperture in the cover may be provided in a member attached to an inclined wall of the cover.

The invention will now be more particularly described, by way of example, with reference to the accompanying drawings, in which :

Figure 1 is a perspective view of one embodiment of an access cover and frame assembly, according to the invention, with the cover removed from the frame for clarity,

Figure 2 is a section showing the cover and the frame of Figure 1 fastened together, the section being taken through one of the fastening devices,

Figure 3 is a perspective view of one of the brackets of Figures 1 and 2,

Figure 4 is a perspective view of another embodiment of a cover and frame assembly, according to the invention, with the cover removed from the frame for clarity,

Figure 5 is a section showing the cover and frame of Figure 4 fastened together, the section being taken through one of the fastening devices, and

Figure 6 is a perspective view of one of the brackets of Figures 4 and 5.

Referring firstly to Figures 1—3, the cover is of rectangular shape and is pressed from a metal plate 1 such as a mild steel plate of e.g. 2mm thickness. The cover includes two lifting devices in the form of dished recesses 2 in the plate 1 and a lifting bar 3 attached to the plate and extending across each respective recess 2. A lip 4 surrounds each recess. The cover is able to at least bear pedestrian traffic loads and has surface protruberances in the

form of small bulges 5 and can also have for instance a frame 6 for framing the maker's name.

Outer, downwardly projecting flanges 7 are formed around the cover by pressing from the plate. Preferably, the flanges 7 are formed in the same pressing operation as the bulges 5, the frame 6, the recesses 2 and the lips 4. At the same time, openings for receiving the lifting bars 3 may be formed by punching out towards the lower side of the plate small tongues of metal (not shown) which remain attached to the side wall of each respective recess 2 and over which passes each respective lifting bar 3. The tongues are subsequently pressed against the respective lifting bar 3 to grip the lifting bar 3 in the openings. Alternatively, the lifting bars may be secured across the respective recesses such as by welding.

The cover also has inner downwardly projecting flanges 8, each formed by one limb of an elongate angle section secured to the underside of the cover such as by spot or continuous welding.

The cover described above has four outer and four inner flanges (i.e. an equal number of outer and inner flanges each corresponding to the number of sides of the cover). However, it is conceivable that the cover may have a single outer flange and/or a single inner flange, each formed by shaping an elongate section, which is then secured to the cover such as by welding.

It is also conceivable that the inner flange or flanges may be pressed from the cover, but in this case the inner flange or flanges will be twice the thickness of the plate.

The frame is also of rectangular shape and comprises four elongate sections which are mitred and welded together at the corners. Each section is cold formed in one piece, preferably by rolling, and each defines an outer channel 9 and an inner channel 10 which receives a resilient seal made, for example, of cellular material such as neoprene. The way in which each frame section can be produced in one piece by rolling is illustrated in Published British Patent Application 2 093 509A. Moreover, the frame could be formed from a single elongate rolled section folded at the corners.

As viewed in cross-section and working from the outer peripheral edge to the inner peripheral edge, each elongate section has a horizontal flange 11, an outer vertical wall 12 made up of both upwardly and downwardly extending portions integral with each other along a fold line at their upper edges, a first horizontal web portion 13 which defines the base of the outer channel 9, an intermediate vertical wall 14 also made up of upwardly and downwardly extending portions integral with each other along a fold line at their upper edges, a second horizontal web portion 15 which defines the base of the inner channel 10 and to which the resilient seal is secured such as by adhesive, and an inner upwardly extending, vertical wall 16. The outer wall 12 terminates above both the intermediate wall 14 and the inner wall 16.

The outer and inner flanges 7 and 8 respectively are arranged so that when the outer flange 7 engages the base of the outer channel 9, the lower end of the inner flange 8 sealingly contacts the resilient seal in the inner channel 10.

The intermediate wall 14 could be arranged so that its upper edge engages the underside of the cover, when the latter is mounted in the frame, to act as an additional load bearing member.

The assembly also includes releasable fastening means for fastening the cover to the frame. Preferably, the releasable fastening means comprises four fastening devices 17. Each device comprises an inverted U-shaped bracket 18 attached to the frame and a headed externally screw-threaded fastener 19 which projects through an aperture 20 in the cover and threadably engages with an internally threaded aperture 21 in the bracket 18. The bracket 18 has a central horizontal web portion 22 in which the threaded aperture 21 is provided and two vertically depending arms 23 the lowermost edges of which each have projecting therefrom a part in the form of an integral finger 24 which is inserted in an aperture 25 in the frame. The free ends of the projecting fingers 24 are angled, such as being bent over by pressing, after insertion through respective apertures 25 so as to extend underneath the frame substantially parallel thereto and preferably although not necessarily towards each other (as shown in broken lines in Figure 3). In effect, the frame is trapped between shoulders 26, defined by each arm 23 and its respective finger 24, and the angled free ends of the fingers 24 so as to securely attach the brackets 18 to the frame and prevent the brackets from coming away as the fasteners 19 are tightened down.

The brackets 18 may be cold formed in one piece from mild steel given a protective coating, in which case a blank is stamped out of mild steel plate, the blank is then pressed to an inverted U-shape and the aperture 21 is subsequently punched out of the web portion 22 in a downwards direction and then tapped. Alternatively the brackets 18 could be formed, for example, of stainless steel or brass.

Instead of bending over the fingers 24, tabs may be provided similar in dimension to the tabs 54′ shown in Figure 6, in which case the tabs can be secured to the frame after insertion in apertures 25 by welding on the underside of the frame.

As shown, the brackets 18 are located in the inner channel 10 of the frame but some or all of them could be located in the outer

channel 9. What is important, however, is that the cover sealingly contacts the frame at a position between the brackets and the inner periphery of the frame to render the cover stenchproof and able to pass the standard smoke test.

In the case of the rectangular cover and frame assembly described, one fastening device is provided midway between the ends of each side of the assembly. However, in some cases, only two such fastening devices will be provided midway between the ends of two opposite sides of the assembly.

The apertures 20 in the cover for receiving the fasteners are formed at the same time as the cover is pressed and are arranged so that when the cover is fastened to the frame, the inner flanges 8 of the cover are inwardly disposed with respect to the fastening devices.

The heads of the fasteners 19 may be provided simply with a slot for accepting a screw driver. However, in order to minimize the risk of unauthorised removal of the cover, each fastener may have in its head a hole or socket so shaped that a suitably shaped key is needed to remove it.

The cover and frame may be provided with a protective coating before they are pressed and rolled respectively and then may be recoated afterwards or alternatively simply be coated after pressing and rolling. Normally, the frame will be coated before the brackets 18 are attached thereto. When coated by hot dipped galvanising, the lips 4 and bulges 5 prevent buckling of the cover.

In addition to the seal in the inner channel 10, there may also be a seal in the outer channel 9 to provide a double seal.

Instead of a resilient seal, the or one of the seals may be of, for example, grease or sand.

Instead of two channels 9 and 10 the frame may have only one channel in which case the inner flanges on the cover may be dispensed with.

Instead of the dished recesses 2 and the lifting bars 3, the lifting devices may be formed by stamping two apertures out of the plate and welding a cup to the plate behind each aperture.

Instead of providing the seal in the inner channel 14, the vertical wall 16 may be extended upwardly and the seal secured to the underside of the cover and arranged to sealingly contact the upper edge of the wall 16 when the cover is fitted in the frame.

Moreover, the frame and/or cover may be of cast iron or ductile iron.

Referring now to Figures 4—6 , the cover is recessed to receive an infill of, for example, concrete, tiles, or asphalt in order to match the surroundings and may be of the skeleton pattern type or of the recessed tray type (as shown). In either case, the cover has a rectangular outer peripheral part 30 which is preferably cold formed. In this case the peripheral part of the cover may comprise four elongate sections 31 which are mitred and welded together at the corners, each section having been formed such as by rolling.

As viewed in cross-section and working from the outer upper rim to the inner peripheral edge, each section 31 has a downwardly extending vertical wall 32, leading to a downwardly and inwardly inclined wall 33 from which depends a vertical flange 34 made up of both downwardly and upwardly extending portions integral with each other along a fold line at their lower edges. The upwardly extending portion of the flange leads to a horizontal inwardly directed web portion 35 from the inner edge of which depends a further vertical flange 36. The two vertical flanges 34 and 36 and the horizontal web portion 35 define an inverted channel 37. A plate 38 may be placed in the bottom of the peripheral part 30 and welded to the upper surfaces of the horizontal web portions or in the case of a cover of the skeleton pattern type (not shown) rods or bars may be secured across the opening defined by the peripheral part.

The frame is also of rectangular shape and comprises four elongate sections 39 which are mitred and welded together at the corners. Each section may be cold formed in one piece, such as by rolling.

As viewed in cross-section and working from the outer upper rim to the inner peripheral edge, each section 39 has a downwardly extending vertical wall 40 leading to a downwardly and inwardly inclined wall 41 from which depends another vertical wall 42. The lower edge of the vertical wall is integral with a horizontal outwardly extending flange 43 made up of an upper outwardly extending portion and a lower inwardly extending portion integral with each other along a fold line at their outer edges. The lower portion projects inwardly beyond the vertical wall 42 and has an upstanding vertical flange 44 at its inner edge. The vertical wall 42, lower portion of the horizontal flange 43 and the vertical flange 44 define a channel 45 which receives a seal, e.g. a resilient neoprene seal, grease or sand.

When the cover is fitted in the frame the inclined wall 33 of the cover engages the inclined wall 41 of the frame and the vertical flange 34 of the cover sealingly contacts the seal in the channel 45.

If desired, the frame could be provided with two channels in a manner similar to the frame of the embodiment shown in Figures 1—3. There may then be two seals, which could be of different types e.g. a resilient neoprene seal in the inner channel and a grease seal in the outer channel.

The assembly also includes releasable fastening means for fastening the cover to the frame.

Preferably, the releasable fastening means comprises four fastening devices 46. Each device 46 comprises an inverted generally U-shaped bracket 47 attached to the frame, a corresponding cup 48 attached to the cover and a headed externally threaded fastener 49 which projects through an aperture 50 in the cup and threadably engages with an internally threaded aperture 51 in the bracket. Each bracket 47 has a central horizontal web portion 52 in which the threaded aperture 51 is provided and two vertically depending triangular arms 53 each having an upper horizontal edge integral with the web portion 52, a vertical edge and an inclined edge from which projects a part in the form of an integral semicircular tab 54. The tab 54 is inserted in an aperture in the frame and then secured to the frame by welding on the underside of the frame. Alternatively, the inclined edge of each arm could have a projecting finger which can be angled, such as being bent over by pressing on the underside of the inclined wall 41 of the frame, similar to the fingers 24 of the embodiment of Figures 1—3.

The brackets 47 may be formed in similar manner to the brackets 18.

It will be noted that the sealing contact between the cover and the frame is between the brackets 47 and the inner periphery of the frame so that the cover can be made stenchproof.

The cups 48 are secured to the cover over respective openings 55 in the cover and receive respective brackets 47 when the cover is fitted to the frame. Each cup 48 has two facing generally triangular vertical sides 56, a rectangular vertical side 57 between the triangular sides 56 and a top 58 in which the aperture 50 is provided. Each cup 48 may be cold formed by pressing in which case the top 58 may be integral with the upper edge of the rectangular side 57 and bent over to contact the upper edges of the triangular sides 56. The cups 48 are secured to the cover by welding along the inclined edges of the triangular sides 56. Alternatively, each cup may be of brass having an ear projecting outwardly from the inclined edge of each triangular side 56 which may be secured to the cover by a rivet. In the latter case the aperture 50 in each cup may be internally threaded so as to be engagable by a tool used to remove the cover from the frame yet dimensioned to allow the fastener 49 to pass through unimpeded.

In this case the cover and the frame may each have a brass run at its upper end.

Again the cover and frame assembly may have two or four fastening devices 46.

Moreover, the heads of the fasteners may be provided with slots for accepting a screwdriver or specially shaped holes or sockets to accept only a suitably shaped key.

The cover and frame may be provided with a protective coating both before and after cold forming or only after cold forming.

Instead of welding the tabs 54 to the underside of the frame, the tabs may simply locate the bracket 47 (or 78) relative to the frame and the bracket can be secured to the frame by welding the arms 53 (or 23) of the bracket to the upper surface of the frame.

Also, the frame and/or cover may be of cast iron or ductile iron.

CLAIMS

1. An access cover and frane assembly, comprising an annular frame, a cover adapted to fit in the frame and releasable fastening means for fastening the cover to the frame, the releasable fastening means comprising at least one bracket attached to the frame and a screw threaded fastener, the bracket having a substantially horizontal portion with an internally threaded aperture therein and two substantially vertical arms each provided along a free edge with a projecting part which extends into an aperture in the frame and by which the bracket is located relative to the frame, the fastener being for extending through an aperture in the cover and for mating with the internally threaded aperture in the substantially horizontal portion of the bracket.

2. The access cover and frame assembly of Claim 1, wherein the free ends of the projecting parts of the bracket are turned under the frame after insertion through respective apertures in the frame.

3. The access cover and frame assembly of Claim 2, wherein the free ends of the projecting parts extend towards each other underneath the frame.

4. The access cover and frame assembly of Claim 1, wherein the bracket is secured to the frame by welding.

5. The access cover and frame assembly of Claim 4 wherein the projecting parts of the bracket are secured to the frame by welding on the underside of the frame.

6. The access cover and frame assembly of any one of the prceding claims, wherein the bracket is of generally inverted U-shape and the substantially horizontal portion defines a web between the two substantially vertical arms which depend from the substantially horizontal portion.

7. The access cover and frame assembly of any one of the preceding claims, wherein the bracket is cold formed in one piece.

8. The access cover and frame assembly of any one of the preceding claims, wherein the internally threaded aperture in the bracket has been formed by punching and then tapping.

9. The access cover and frame assembly of any one of the preceding claims, wherein the cover and frame have been cold formed.

10. The access cover and frame assembly of any one of the preceding claims, wherein the frame and cover have a protective coating.

11. The access cover and frame assembly of Claim 10, wherein the frame was given its protective coating before the bracket was connected thereto.

12. The access cover and frame assembly of any one of the preceding claims, wherein the annular frame defines at least one annular channel for receiving a seal and the cover has at least one downwardly extending flange adapted to be received in the annular channel of the frame in sealing contact with the seal.

13. The access cover and frame assembly of claim 12. wherein the annular frame defines an inner and an outer annular channel and the cover has inner and outer downwardly extending flanges, the outer flange(s) being arranged so as to be received in the outer channel and the inner flange(s) being arranged to be received in the inner channel, at least the inner channel being for receiving a seal.

14. The access cover and frame assembly of claim 12 or claim 13, wherein the bracket is disposed so that, in use, it is on the side of the contact zone between the seal and the cover remote from the inner periphery of the frame.

15. The access cover and frame assembly of any one of the preceding claims, wherein the cover is of metal plate and has a load bearing surface having a lifting device comprising a recess pressed in the plate and a lifting bar attached to the plate and extending across the recess.

16. The access cover and frame assembly of any one of claims 1—14, wherein the cover is recessed to receive an infill.

17. The access cover and frame assembly of claim 16, wherein the bracket is connected to an inclined wall of the frame and the aperture in the cover is provided in a member attached to an inclined wall of the cover.

18. An access cover and frame assembly, substantially as hereinbefore described with reference to and as shown in Figures 1—3, or Figures 4—6 of the accompanying drawings.

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